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Hoisting Engines.

This class of labor-saving appliances is fast coming into general use, and the many improvements which have been made have removed the only objections which have heretofore prevented a more general adoption. The manufacturers of the engines represented by the accompanying engravings, have made a specialty of their manufacture for a number of years past, and by practical experience have adapted them to the many uses to which they are appropriate. In the engraving (fig. 2), the boiler is of the ordinary vertical style, with enclosed fire box and tubes running through the water and steam space. In the boiler great care is taken to secure great strength, and the material is all selected from the best makers. Each tube forms a brace, connecting the crown sheet with the upper head. This boiler is securely fastened to a cast iron bed plate, which can be mounted on wheels if necessary. On this bed plate the engine and hoisting machinery are fastened, and by braces, etc., the whole is so connected that it can be moved from place to place without injury. All parts of the engine are so made that duplicates can be furnished at any time.

Fig. 1.

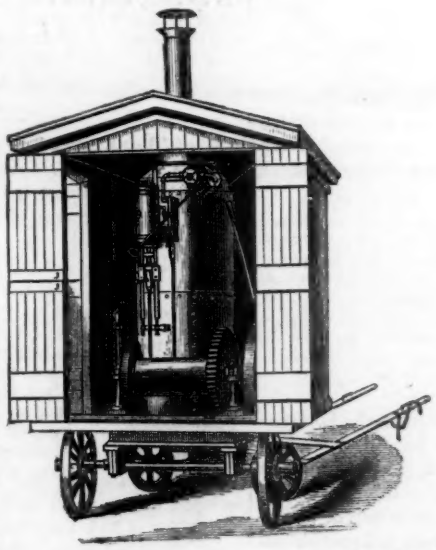
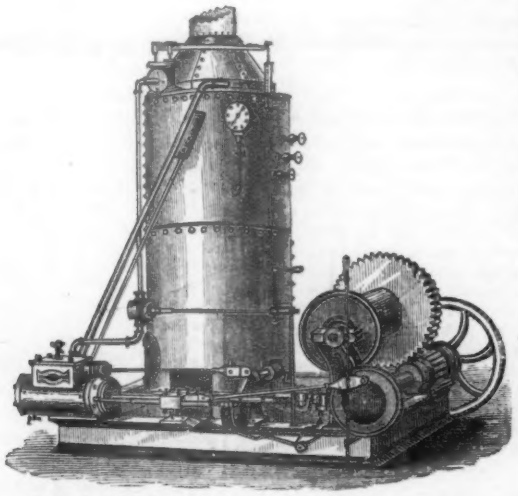


Fig. 2.



HOISTING ENGINES.

Fig. 1 represents a machine similar in description to the other, except that the engine and hoisting apparatus are attached to the boiler, and the whole covered by a suitable house, in order that it may be used on piers, or in the open air, without injury to the machinery. The whole is mounted on wheels, so as to be easily moved from place to place, as occasion demands.

Besides the styles here shown, the manufacturers build them with the ordinary locomotive style of boiler, the engine being in that case attached to a bed plate on the side. Sizes running from five to fourteen horse-power are furnished, and are usually to be found at the warerooms. A great many of these engines are now in use in this city, aed the demand is constantly increasing.

Messrs. Cook, Rymes & Co. are the manufacturers, and their salesrooms are at Messrs. W. L. Chase & Co., No. 93, 95, and 97 Liberty street, New York.

Gas Pipes and Lightning.

In a recent communication on the general subject of Lightning, Prof. John Wise discourses as follows:

"As it is suggested that lightning rods should be brought into metallic connection with underground gas and water pipes, let us see how the matter stands, at all events with gas mains, as communicated by reliable persons.

"In Terre Haute, Ind., a thunderbolt struck the rod on a church steeple, tumbled the rod down, ran on to the gas pipes in the wall of the church, hurling brick and plaster outside and inside the building; then after crushing the gas meter and igniting the gas, it ran on the street main, following it for a distance of 1000 feet, bursting the joints of the main here and there along its line. Lead, being the material the joints were packed with, and it being a slower conducting metal than iron, was the cause of the bursts, occurring, no doubt, at those joints where the iron was completely insulated by the lead packing.

"Another case occurred in Indianapolis, and there, after it had done considerable damage along the lightning rod of a dwelling, it ran down and over 400 feet of street gas main, and burned every particle of lead out of the joints, leaving, as the gas engineer of the works states, nothing but dross behind. Both these cases were communicated to the Franklin Institute Section by the intelligent engineer of these works. Another case occurred last summer in Iowa city, and was communicated to the Section by the Hon. S. E. Paine, mayor of that city. It struck the rod on a church steeple, tumbled it down, passed thence through a metal roof, on to a gas pipe in the building, following the pipes to the meter and crushing that, setting fire to the gas, and thence on to the street main, melting the lead packing out of the joints for a distance of 400 feet.

"From these three cases, we may have an idea of the proximate quantity of metal necessary to the dissipation or neutralization of a thunderbolt. Certain it is that the energy of a thunderbolt must find its equivalent of neutralization bef ore it ceases to de[illegible]lop its projectile force. In my investigations I learn most unequivocally that the force of a thunderbolt is always destructive when it passes from a good to a bad, or from a bad to a good, conductor; and not only that, but when it passes from a small iron conducting surface suddenly to a larger one, it does the same thing. Where it flies from an ordinary lightning rod to so large an iron conductor as a six inch street main, it leaves behind it the marks of violent force."

A Permanganate Battery.—Mr. J. H. Koosen has experimented upon the substitution of permanganatef of potassa for the nitric acid of the Grove Platinum Battery, and asserts that the electromotive force of this combination is greater than that of the Grove. The following combination—platinum in a solution of permanganate with 1-30 of sulphuric acid added, and amalgamated zinc in diluted sulphuric acid—gave the electromotive force as the average of more than one hundred measurements, to be between 1·9 and 2·2 (Daniel, 1).

[It is now some seven years since the Editor of this Journal proposed this same mode of charging batteries. The plan being tried at that time, however, by the Messrs. Chester, manufacturers of telegraph instruments in Centre street, New York, and their report regarding permanency not altogether encouraging, it was not followed up.—H. W.]

We learn that a proposition has been made to the City Council of Eufaula, Alabama, to light the streets with gas.

Chemical Repertory,

No. 69.—June 3, 1872.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

280. Taste etc., of Carbolic Acid.–Declat.–A peculiarity in the taste of this acid is remarked upon; it being first sweet, then a fresh taste like that of mint, then styptic becoming gradually caustic, an effect more like that of alcohol than of most acids. The solubility of carbolic acid appears to be in debate, Runge and others having stated that 3·26 per cent. only would be contained in a saturated water solution of it, while Parisel claims that from 3·5 to 4 per cent. can exist in a saturated solution.—*Am. Chemist.*

281. A Neat Experiment with Oxygen.—To show that oxygen can be burned in hydrogen, Ballo employs an ordinary glass chimney, such as is used on kerosene lamps, and fastens it to a holder, and through a perforated cork at the large end introduces a stream of illuminating gas. The gas is ignited at the small end, through the opening is introduced the tube conveying a current of oxygen; the oxygen takes fire in passing through the flame at the aperture, and continues to burn in the interior of the cylinder, sometimes with the same singing tone as is exhibited by hydrogen.—*Jour. of Applied Chem.*

282. Bad for Poor John Crow.—A farmer in Connecticut has just contrived an infernal machine for the destruction of crows, in the shape of a kernel of corn which explodes on being picked up by the unsuspecting bird, and blows his "durned eturnul head off"* without the slightest warning.

* *Squibob Papers*, i, 15.

283. Preservation of Grain *in Vacuo*.—M. Louvel has brought before the French Academy a plan of storing wheat in portable sheet-iron granaries, in which a vacuum is maintained equal to at least from three to four inches of mercury, this being found sufficient to destroy all insect life (although a much more perfect vacuum is preferred) and to insure the evaporation of any moisture in the grain. The apparatus is of cylindrical form, placed vertically, and with convex top and bottom. The top is provided with an opening through which the inlet of the grain is had, with a valved pipe through which the air is exhausted, and with a gauge by which the degree of exhaustion is indicated. The grain is removed through an opening (provided with a suitable closing device) in the bottom. The pump, which can be used for any number of the grain receivers, costs about one hundred and eighty dollars extra. In one experiment, where living insects were introduced in large quantities with the grain, it was found that they were all killed before doing mischief, and at the end of six months the wheat was found to be in as fine condition as at the outset.

284. Sulphuretted Resins.—In examining the action of boiling aniline upon sulphur, Merz and Weith obtained, together with a sulphuretted base *thianiline*, $C^{12}H^6SN$, formed by substitution of H by S in aniline, large quantities of resinous products containing sulphur. Boiling *toluidine*, with sulphur, gives similar resins with formation of a sulphuretted base *thiotoluidine*. HS is evolved in both reactions. These resins were freed from the bases by treatment repeatedly with HCl. The aniline resin constitutes a greenish-black mass, hard and brittle when cold, containing 20.9 per cent. of sulphur, soluble in concentrated boiling HCl, precipitated by water and especially completely by ammonia. Thianiline is also converted by concentrated HCl at 300 deg. C. into chlorohydrate of aniline, with separation of a still more highly sulphuretted resinoid, containing 34.6 of sulphur.

These observations are at least suggestive in connection with the growing conviction, among analysts of carbohydrogen minerals, that the sulphur in coals, which imparts itself to the gas, at least partly, in forms not yet fully understood, is often contained therein in some kind of organic combination. Prof. Church recently called the attention of the London Chemical Society, in connection with his well-known Australian sulphuretted resinoid, *tasmanite*, to a recently obtained artificial product consisting of an oxidized essential oil combined with sulphuretted hydrogen, and having the composition $(C^{10}H^7O)^2HS$, being in the same relative proportion as in tasmanite. The latter evolves HS when treated with sulphuric acid. He also stated that another fossil resinoid, *dysodile*, contains sulphur.

285. Carbonic Acid *vs.* Fires.—Anent the project of using this gas for putting out conflagrations, Prof. Phin, in his new Journal, *Handicraft*, says:

"That gases can be easily conveyed through streets, is seen in our coal-gas; but when the latter escapes, as it frequently does, it rises into the air and passes off, while, moreover, its presence, even in small quantity, is readily detected by the smell. Carbonic acid, on the other hand, is so heavy that it would collect near the surface of the ground and in cellars faster than it could escape by diffusion; it has no marked odor, and there would be nothing to indicate its presence to those who should attempt to enter places where it was confined. And as it arrests life as instantly and as effectually as it does fire, the number of victims that would fall a sacrifice to it would probably be very great. These facts have been frequently pointed out, and they show us that a system for extinguishing fires may be theoretically perfect, while in practice it is entirely inadmissible."

286. Extinguishing Burning Petroleum, Etc.—A patent issued to H. Baker, Chicago, March 26th. This invention comprises the combination of a tank and suitably arranged cover and tubes. Also, the combination with such tank for containing inflammable liquids of a perforated gas-conductor, so constructed and arranged as to discharge gas quickly over the entire surface of the fluid contained in the tank.

287. Beaten.—The miners who stopped work at the Grass Valley, Cal., mines, because of the introduction of dynamite, have recalcitrated and gone back to their employment.

288. Detecting Tallow in Wax.—Dr. Hardy.—The author first prepared pure beef suet, and carefully determined the specific gravity of this substance, which he found to be 0·8868; next he prepared an alcoholic fluid of such a degree of concentration that a piece of the suet alluded to remained suspended (that is to say, sunk therein to a certain depth, and then remained at rest) in it. This alcohol was found to have a specific gravity of from 0·8882 to 0·8857 between 71 deg. and 72 deg.); the specific gravity of wax is between 0·962 and 0·963; hence it follows that alcohol at 29 deg. will keep wax suspended. Starting from these data, the author has constructed a tabulated form, by the aid of which it becomes possible to detect adulteration of wax with suet (tallow).—*Chem. News.*

289. Detecting Water in Gases.—J. Myers.—The author calls attention to the fact, discovered by him, that when so-called dry gases (dried by the best possible means) are caused to pass through boiling sulphur, that substance will give the means of detecting the presence of water in gases which do not chemically act upon sulphur under these conditions.—*German Chem. Society.*

290. Manipulation of Spongy Platinum.—In view of the fragility of the ordinary preparations of spongy platinum, as used for kindling gases, Prof. Phin recommends the following capital plan:

"We have succeeded admirably with pumice stone, which we first form into a cylinder of the proper size—say three-eighths of an inch in diameter—and then cut into discs about the twentieth of an inch thick, by means of a fine saw. These discs are soaked for some time in a strong solution of bichloride of platinum in alcohol, and afterwards for an equal period in an alcoholic solution of sal-ammoniac. After being ignited, these discs inflame a jet of hydrogen readily, and we find that they retain their power quite as well as the more delicate forms in common use."—*Handicraft.*

291. The Milky (Rail) Way.—During the past four years the Erie Railway has brought forty-two thousand million gallons of milk to New York city.

The following, however, appears rather "steep":

The *Atlantic Monthly* has discovered that, if the milk product of the country could be devoted to paying the national debt, it would square the account in five years.

292. Absorbing Sulphurous Fumes.—M. Cahen.—The author suggests for this purpose the use of peroxide of manganese of low quality. The absorption of sulphurous acid gas, including that evolved in metallurgical operations, is instantaneous; and if the ensuing manganese salts do not happen to be commercially of use they can be readily, by means of chloride of sodium, converted into hyposulphite of soda and other soda salts.

293. Durable Soap Bubbles.—To obtain soap-bubbles that will show the changing colors of the rainbow, the directions are as follows: Take three-quarters of a pint of water that has been boiled and become cold, and put into it a quarter of an ounce of Castile soap, cut up fine. Put this into a pint bottle, and set it in hot water in a saucepan, on the fire; there let it remain an hour or so, now and then giving it a good shaking, till the soap is dissolved. Let the fluid stand quiet for the impurities and coloring matter of the soap to settle; then pour off the fluid and add to it four ounces of glycerine and your soap-bubble solution is ready. In an ordinary way you may blow the bubbles easy with a tobacco pipe, but if you wish to attain scientific perfection, you had better employ a glass pipe. By adding a larger quantity of glycerine you may make these bubbles so strong that you can play battledore with them.—*Journal Applied Chemistry.*

294. Action of Essential Oil of Mustard on Milk.—Dr. Schwalbe.—One drop of the oil added to 20 grms. of milk prevents the latter being coagulated, even in hot summer weather, for several weeks, but the constituents of the milk so treated become altered, the caseine becomes converted into albumen coagulable by heat, and this coagulum is difficultly soluble in concentrated hydrochloric acid; ether precipitates this albumen, but dilute acetic acid does not produce coagulation. The milk becomes very sour; it would appear that the caseine is oxidised.—*Germ. Chemical Society.*

295. A Voice from the Past.—*To the Editor of the New York Times:* For an old Gothamite to read articles in papers about the coming drought is amusing. Pass the corner of Fourth street and Lafayette place, there is an old pump (now out of repair) which in its day gave ample supply of cold water. Still, we have the wells all over the city covered with planks, which can soon be used in an emergency. Oh, how I liked the old pump in front of the hospital in Broadway; no use for ice when you drank it. All we want now is new pumps; then we shall have enough for use in fires and watering streets. Ask old New Yorkers and they will agree with me in the suggestion to find this remedy in the hour of danger, which now seems to be unknown to the rising generation. Senex.

[We fear that "Senex," with advancing years, has retained his youthful enthusiasm. To supply the necessities of New York from wells and pumps, seems to us chimerical in the extreme.—Ed.]

296. The Torbanehill Mineral.—We have learned on good authority that Mr. Gillespie, of Torbanehill, has sold his present stock of the Torbanehill mineral for the sum of £70,000, and future contingencies. We understand that the stock in question constitutes a large portion, if not indeed the larger portion, of all of this celebrated mineral which the mineral field now comprehends. It is of some moment to know that this mineral is so nearly on the point of exhaustion, and, indeed, of complete extinction. But with that liberality and provision which distinguish Mr. Gillespie, he has taken care, under the aspect which the case presents, to prevent so wonderful a substance vanishing for ever without leaving a trace of its existence behind. Accordingly, he has retained in his own possession, independent of the sale of his stock, a certain number of tons, with the view of distributing specimens to the museums and the halls of the various scientific bodies in Great Britain, and, indeed, all over the world. If we have not been misinformed, Mr. Gillespie has specifically bargained with the fortunate possessors of his valuable stock of mineral "that he may make presents of specimens to scientific or other bodies, or any other persons for scientific purposes, as he may see fit, as lasting memori-

als of a unique mineral which is in course of rapidly disappearing from the face of the earth.—*Lon. Min'g Journal.*

287. Atmospheric Thermal Paradox. — "The higher we ascend, the colder it becomes; and yet at very great elevations the rays of the sun exert a heating power greater than that which they are found to produce in the valleys. Prof. Piazzi Smyth found, that on the top of Teneriffe, at an elevation 10,000 feet above the level of the sea, a thermometer exposed to the direct rays of the sun, showed a temperature of nearly 200 deg. Fah.!"—*Prof. Phin, in Handicraft.*

298. Detection of Acidity in Oils.—A. Rumpler.—The author first prepares chemically pure carbonate of soda, makes a concentrated aqueous solution of it, fills with that solution a test-glass, so as to form a layer of 26 m.m. in height, and next pours the oil to be tested on it and stirs the fluids thoroughly for a few moments. On being left quietly standing the oil should not, at the surface where it touches the soda, exhibit any greasy emulsion; if it does it contains acid, and if the quantity of the latter is somewhat considerable the whole mass becomes so thick, that the glass can be turned upside down without the mixture flowing out.—*Chemical News.*

299. Railway Foot-Warmers.—In Germany, a method has been used, known as Kienast's method, of filling cases with an artificial fuel, which consists of pulverized charcoal, nitric acid, and starch. At first this was put in iron cases 628 mm. long, 105 mm. broad, and 65 mm. high, which were perforated in the sides. This was found, however, to be productive of headaches, and the fuel was, therefore, put into closed cases, which were pushed from the outside under the seats. The fuel, as used, was made up in half-pound pieces, 105 mm. long, 80 mm. broad, and 60 mm. thick. In an experiment on the line between Aix und Berlin, eight pieces were used, in four cases, for the heating of one compartment. After a sixteen hours' journey, the pieces of charcoal were still glowing, and a thorough heating of the compartment had taken place, The cost of a hundred-weight of the fuel is 10 thalers (30s.), and the heating now referred to cost 10½ *sgr.*, or about 1s.

300. Spontaneous Explosions.—Rev. F. Moigno.—When finely pulverized chlorate of potash is put on a piece of paper (best dredged or dusted over it, so as to form a thin film of powder), and there is next poured over it a solution of phosphorus in bisulphide of carbon, there ensues, when the latter is evaporated suddenly, a most violent explosion, owing to the phosphorus being left in a state of extremely minute division and in intimate contact with chlorate of potash. This explosion is analogous to that which ensues when a small piece of phosphorus and some chlorate of potash are, when placed upon an anvil, struck with a hammer, but, in the instance alluded to, the effect produced is greater, owing to the extreme state of division and intimate mixture of the two substances. Care should be taken not to make this experiment with too large quantities of the chlorate and phosphorus solution, for fear of serious accidents which might ensue.

301. Fuel for the Utah Silver Mines.—Scarcity of fuel has been the most serious hindrance to the rapid development of these mines. The immense quantity of smelting ore here would have soon exhausted in its reduction all of the charcoal available, except at a price for the article that would have embargoed the reduction of low and middling grade ores. It was assumed upon very imperfect experiment that the Rocky Mountain coal would not coke. Mr. Stowe, a San Franciscan, who has a lease of the Hinton mine at Evanston, a few weeks ago employed some cokers and essayed the experiment of converting coal to coke upon a large scale with almost perfect success. This success settles the question of fuel. Coke can be furnished at the mines in any quantity and at a price that will reduce the fuel cost of smelting one-half, and this makes available, mines that else could not have been worked, and greatly increases the profits of those that yield ore rich enough to be worked at a profit, even under the present expensive system of smelting.

302. New Product from Aniline.—Braun and Greiff observed that when a large quantity of commercial aniline is distilled along with lime, the last portion of the distillate is not quite freely soluble in hydrochloric acid; further investigation led to the conclusion that the properties of that substance agree with those of carbazol, as described by Graebe and Glaser. Carbazol is present in crude tar oil, but the authors surmise that this substance might be formed by the drying of the mixture of aniline and lime in contact with the very hot metal of the iron still.—*Germ. Chem. Society.*

303. Abietene, a New Hydrocarbon.—W. Wenzell.—This hydrocarbon is the product of distillation of the terebinthinate exudation of a coniferous tree indigenous to California, viz., the *Pinus sabiniana*, a tree met with in the dry sides of the foot hills of the Sierra Nevada mountains, and locally known as the nut-pine or digger-pine, owing to the edible quality of its fruit. A gum resin, or rather balsam, is obtained from this tree by incisions made in its wood, and the balsam submitted to distillation almost immediately after having been collected, owing to the great volatility of the hydrocarbon (or essential oil, because abietene really stands in the same relation to the balsam alluded to as oil of turpentine stands to the exudation derived from other *Pinus* species). The crude oil, as usually met with for sale at San Francisco, is a colorless limpid fluid, requiring only to be redistilled to obtain it quite pure. The commercial article is used under different names—abietine, erasine, theoline, etc.—for the removal of grease and paint from clothing and woven fabrics, and likewise as an efficient substitute for petroleum-benzine. Pure abietine (the commercial article having been ascertained by the author to be a homogeneous liquid) is a colorless fluid, exhibiting a strongly penetrating odor bearing some resemblance to oil of oranges: sp. gr. at 16·5 deg.= 0·694; it is very volatile, highly combustible, burning with a brilliant white smokeless flame, almost insoluble in water, and soluble in five parts of alcohol at 95 per cent. Abietene is not acted upon by dry hydrochloric acid gas nor by nitric acid (sp. gr.=1·43) in the cold, but heat being applied a slight reaction took place; neither concentrated sulphuric acid nor potassium act upon this hydrocarbon; when treated with chlorine, abietine is converted into fluid of the consistency of glycerine, insoluble in water, colorless, soluble in warm alcohol, and having a sp. gr.=1·666. Abietine readily dissolves iodine and bromine, and is a powerful solvent for fixed and volatile oils, castor oil excepted, and also Peru balsam and Canada balsam; castor oil is absolutely insoluble in abietine, while curiously enough, the last named substance is dissolved by castor oil to some extent. When burned in an ordinary spirit lamp (such as are used in chemical laboratories) with not too large a flame, a brilliant white light is obtained without smoking; the vapor of abietine is a powerful anæsthetic when inhaled, and it has been used with success as an insecticide, against moths, etc., when sprinkled in closed receptacles. The ultimate composition of abietine is not stated, but the author points out at some length the differences existing between abietene and terebene (oil of turpentine).—*Amer. Jour. of Pharm.*

304. New Coal-Cutting Machine.—Patented by Messrs. Gillot and Copley, and worked by compressed air.—The machine consists of two seven inch cylinders, with 12 inch stroke, driven by bevel-gearing, having a horizontal wheel, with cutters fixed in the periphery. It is mounted on four wheels, and traverses along the face of the coal by means of a wire rope three eighths of an inch in thickness. The air compressor is of the ordinary character, having a 14 inch steam-cylinder and a 15 inch air cylinder. The machine was set to work in what is known as the Dunston Seam, which is about three feet thick. The whole length of 70 yards was completed, including stoppages, in the astonishingly quick time of one hour 17 minutes. The average depth holed was about 3 ft. 4 in., the groove made in cutting being about 8 in. The pressure of the air was 21 lbs. The results given were considered in the highest degree satisfactory, and the new machine may be pronounced a great success. Since the trial we understand that the same length has been accomplished in 60 minutes. The machine is well adapted for working in seams of almost any thickness, being 5 feet in length, 2 feet 4 in. wide, and 2 feet 4 in. in height.—*London Min. Jour.*

305. New Acoustic Experiment.—Let a wide glass tube, open at both ends, be taken, and in this a piece of fine wire gauze be pushed up some little distance. If the gauze be now heated to redness over an ordinary Bunsen burner, and then removed, it will shortly emit a shrill note, lasting from five to ten seconds. The experiment will be new to most of our readers, and has the merit of always going off.—*Jour. Franklin Institute.*

306. Engraving Extraordinary.—Claude Mellan engraved in 1700, a full head of Christ with one unbroken line. This line commenced at the apex of the nose, and wound out and out like a watch-spring, until it ended in the border of the picture.

307. A New Fluorescent Body.—President Morton, of the Stevens Institute, announced in a recent lecture that, in the course of the examination which he had been making of substances of this class, he had encountered one which he believed to be as yet unknown, and which possessed the property of developing light by fluorescence in a pre-eminent degree. This body was obtained from petroleum, and he would propose to take for it the name "viridine." The word viridine had been already applied as a synonyme for chlorophyll, but was now practically obsolete, and too appropriate to the present substance to be thrown away. A large drawing of a flower, with leaves painted seemingly in light umber tints, was then shown and illuminated by electric discharges, when it appeared of the most vivid green. The peculiar fluorescent spectrum of this body, and its relations to the spectra of other substances was explained, and many other illustrations were exhibited.

308. Melancholy.—In a recent trade-mark suit, relating to the manufacture of mustard, Dr. Ogden Doremus, of this city, swore that mustard seeds contained over 11 per cent of starch. To prove it, he used a solution of iodine upon mustard placed on filtering paper, *which paper* gave, when tested, the characteristic reaction of iodine with starch when no mustard was present. The error in the experiment was pointed out by Professors Seely and Chandler. Dr. Doremus was aided by Dr. Austin Flint, who tried to confirm by the use of a microscope what Dr. Doremus tried to prove by the iodine test. Dr. Flint swore that he could see the granules of starch by the use of a high power. Professors Seely and Chandler could not see any such granules, but they did see what they thought might have been fragments of the exterior envelopes of the seeds. Dr. Doremus has, in a letter since published, reaffirmed the presence of starch in mustard seed (he says nothing of the percentage), and attempted to prove it by a test which would give the same results with cellulose as with starch.—*Sci. Amer.*

309. A Lucky Gas Company.—From correspondence in the New York *Times* we learn that the gas bill, at a recent festival in Rio de Janeiro, amounted to $150,000:

"No gas company ought to pay better than that which furnishes this city with light. The original contract with the city was for so much a lamp, and the company was allowed to establish these wherever it pleased. The result was that lamp posts went up everywhere, and in certain streets they are separated by an interval of about thirty feet only. But this is not all. The Brazilians are famous for celebrations and festivals; their calender is filled with them. But a festival is nothing without an illumination at night, when the interest is always at its height, and this whether the celebration be religious or secular in its origin. So the gas company keeps on hand, for constant use, an immense quantity of extra piping, which can be put up at an hour's notice, and bent in every shape."

310. A Painful Business.—The *Telegrapher* states that the Paine Electro-Magnetic Engine Company bubble, late of Newark, N. J., has gone up, that the inventor has gone back to the East, where the wise men came from, and that the stockholders have experienced a galvanic shock in the shape of a total loss of their interests.

311. The Old Dispute Again.—During the past month, the residents of Stuyvesant square, and all that part of the city lying between Third avenue and the East River, have suffered more or less from nausea, in consequence of a foul stench which has been wafted through the windows on the night air. Already many families have been compelled to remove to other neighborhoods, in order to escape its deadly effect. There are numerous theories as to the source of the stench, some believing that it comes from the gas

houses, while others favor the notion that it can be traced to well-known chemical works in Nineteenth street. But the filthy condition of the streets from Second avenue to the river, probably has a great deal more to do with the abominable odor than either the gas houses or the chemical works.—*Daily Paper.*

312. More Scientific Legislation.—"Ohio has enacted by law that eighty-eight cubic inches of bituminous coal shall weigh just sixty pounds avoirdupois."

[This reminds us again of the famous bill brought before the late Incubus at Albany, which imposed on gas coal the duty of evolving no carbonic oxide.]

Report on Sulphur-Purification at the Beckton Gas-Works, by the Gas Referees.

TO THE LORDS OF THE COMMITTEE OF PRIVY COUNCIL FOR TRADE.

[Condensed by Editor of this Journal.]

[Continued from page 156.]

In instituting a comparison of this kind, it is necessary to take into account the difference in the size of purifiers and also in the make of gas at these two works. The purifiers at Beckton are circular, 25 feet in diameter, consequently with an area of 491 sq. ft. each; while the purifiers at Bow are square, 26 in. by 26 in., and with an area of 676 square feet each. The gas-make at Beckton is double that at Bow—the maximum make for the former being at present 250,000 feet per hour, while at Bow it is only 120,000 feet per hour. A perfect comparison, therefore, can be made only by taking the quantity of lime in *constant* action at each of those works, and also the quantity of *clean* lime daily put in action, relative to the quantity of gas manufactured. At the same time we give the whole statistics of the case:

	1. Quantity of lime in all the Purifiers.	2. Quantity of Lime in constant use.	3. Quantity of lime changed per day. A'vg
Beckton.....	(16 Purifiers.) 15,708 cu. ft.	(12 Purifiers.) 11,781 cu. ft.—¾ of whole quantity.	1,062 cu. ft.—1-11 of whole quantity in constant action.
Bow Common.....	(3 Purifiers.) 3,366 cubic ft.	(2 purifiers.) 2,244 cu. ft.—⅔ of whole quantity.	336.6 cu. ft.—nearly 1-6 of whole quantity in constant action.

	1. Ditto per 1000 feet of hourly gas-make.	2. Ditto per 1000 feet of hourly gas-make.	3. Ditto per 1000 feet of hourly gas-make.
Beckton.....	32.8 cubic ft.	47.1 cu. ft.—¾ of whole quantity.	4.2 cu ft—fully 1-11 of whole quantity in constant action.
Bow Common.....	28.05 cubic ft.	18.7 cu. ft.—⅔ of whole quantity.	2.8 cu. ft.—nearly 1-6 of whole quantity in constant action.

From this table it appears that, relative to every 1,000 feet of gas purified, at Beckton the *quantity of lime in constant action* is fully 2½ times as great as it is at Bow. Moreover, of this quantity of lime in constant action, the proportion of *clean lime put into action per day* is one-half greater at Beckton than it is at Bow Common, relative to the make of gas.

It was manifest that, although it had baffled detection, there must be a perfectly adequate and definite cause for these startling variations in the action of lime purifiers; and the referees were perfectly confident that by well-directed investigations this cause will be thoroughly understood, with great advantage to the public, and to some extent also to the companies themselves.

Acting on this principle, the referees have been and are carrying on a series of very varied experiments at the Beckton works, which will be of use not only as regards these works, but all other gas-works also.

If the conditions under which lime acts efficiently upon the sulphur-impurity (in other forms than sulphuretted hydrogen) were adequately known, the purifying power might be increased by the simple process of augmenting the size of the apparatus and quantity of the purifying material. That this is not the case at present is amply demonstrated by the above-given statistics of the Bow and Beckton works, where the superior size of the purifiers, and the greater quantity of lime in constant action, relative to make of gas at the latter works, give far inferior results to those obtained from the smaller quantity of lime used at Bow. Neither does the amount of sulphur vary with the other element of expense, and of increase in the purifying apparatus; namely, the more frequent re-charging of the purifiers with fresh material, whereby more lime is actually used although the quantity of lime in constant action remains the same.

[A paragraph ensues, on the cost of sulphur-purification at Beckton; which we omit, as chiefly of local importance.—Ed.]

Temperature of Distillation.

Another point to be noted is the temperature under which the gas is distilled from the coal. In their first sulphur report the referees drew attention to the important desideratum of a reliable pyrometer practicable for use in gas-works, to determine correctly the heat of the retorts, and thereby facilitate experiments as to the effect of various temperatures upon the development of sulphur in other forms than sulphuretted hydrogen. Such an instrument is still wanting; but, as is well known, a rough criterion of the heat of retorts (in other words, the temperature under which the gas is distilled) is furnished by the quantity of gas made from each charge of coal—the coal yielding a larger quantity of gas (though of inferior illuminating power) when a high heat is used.

Taking into account the size of the retorts at Beckton, the make of gas indicates a lower heat than is used in the other London gas-works. This may be better shown by stating the amount of gas distilled from each ton of coals, which is only 9,300 cubic feet at Beckton, whereas in most other gas-works it is at least 9,500 cubic feet. On some consecutive days, the make per mouthpiece averages only 4,800 cubic feet, whereas on others it rises to 5,100. But, as will be readily understood by persons conversant with gas manufacture, these differences are occasioned mainly by the dates of the unloading of the coal-ships. The first truck loads of coal taken out of the ships mainly consist of the larger pieces of coal, while the dross comes afterwards; and coal in such pieces carbonises more quickly in the retorts than the dross does, so that, although the heat of the furnaces remains the same, the retorts are hotter and the make of gas quicker in the former than in the latter.

At the same time it must be said that, although the general temperature of distillation at Beckton is unusually low, there may nevertheless be some of the retorts which are overheated, in which case the hydrocarbons in the coal would be more quickly given off than in the other retorts, leaving the coke to be roasted; in which case a larger amount of "sulphur" would be produced than usual. According to the ordinary estimate, about one-half of the sulphur which exists in the coal remains in the residuary coke; but unquestionably the higher heat to which the coke (that is, the coal from which the hydrocarbons have been distilled) is subjected, the larger will be the proportion of the sulphur given off. Moreover, the hydrogen having been already driven off, the sulphur-vapor from the coke will then tend to combine with the glowing carbon, forming bisulphide of carbon, that is, the sulphur impurity other than sulphuretted hydrogen. The amount of this impurity in the crude gas at Beckton induces the referees to conjecture that some such defect actually exists.

Kinds of Coal Used.

If any efficient process of purifying gas from sulphur, in other forms than sulphuretted hydrogen, were in use, the kind of coal used in gas-works would be a matter of no importance as regards the sulphur impurity. But since, at present, even the lime process at its best—as in the Bow works—allows about one-half of the "sulphur" to remain in the gas, it is obvious that the amount of "sulphur" in the gas supplied to the public may depend to a considerable extent upon the kind of coal used in the retorts. Sulphur exists in coal chiefly in combination with iron, as pyrites, and also to a small extent in union with lime and magnesia, as sulphates; but as the two latter compounds do not readily part with their sulphur, even under the high temperature of the retorts, it is only the sulphur which exists in the coal as pyrites that is given off in the gas, forming sulphuretted hydrogen, bisulphide of carbon, and it may be to a small extent other compounds not yet ascertained. It is the accepted belief in gas-works that some kinds of coal produce more bisulphide of carbon in the retorts than others; but it seems to the referees that it would be more correct to say that these kinds of coal only tend to produce more "sulphur" in the gas by yielding more or less of other elements which, as will appear in the sequel, considerably affect the action of the purifying processes upon the "sulphur"-impurity.

[We omit here a table specifying the mixtures of coal used, which were complex, and varied each week, but which are of minor interest to the American Fraternity.—Ed.]

The Table appears to indicate that the chief difference between these kinds of coal, does not consist in the amount of "sulphur" which they yield in the retorts, but in the *effect of their other products* (NH_3, CO_2, etc.,) *upon the action of the processes of purification.*

This is a point which hitherto has never been noted, the attention of gas engineers and other inquirers into "sulphur"-purification having been confined to the amount of sulphur in the coal; but its great importance will be made fully apparent in the sequel.

Effect of Ammonia in the Purifiers.

It is maintained by several authorities on the chemistry of gas-purification, that it is advantageous, if not indispensable to effective "sulphur" purification, that a considerable amount of ammonia should be allowed to pass into the purifiers; and recently this course has been recommended as a means of remedying the failure of the "sulphur" purification at Beckton. The Referees saw no reason to anticipate any good result from this theory; at the same time, in so embarrassing a case, they thought it right to give it a fair trial. Accordingly, they directed that the scrubbing power should be temporarily reduced, so as to allow an unusual quantity of ammonia to pass forward in the gas into the purifiers. In order to protect the company against penalties during this period of experiment, the referees temporarily suspended the ammonia maximum for the Beckton works, at the same time directing that trays of sulphate of iron should be introduced into the last set of purifiers, so as to lessen the risk of ammonia escaping in the gas as supplied to the public; and so efficiently was this done, that no excess of ammonia occurred. The results of the experiments conclusively prove that the introduction of ammonia into the purifiers had no effect whatever in eliminating the sulphur-compounds other than sulphuretted hydrogen. For example, during the nine days (ending with Nov. 17), when ammonia was allowed to pass in large quantities into the purifiers, the daily average of ammonia admitted into No. 1 purifying house was 22.1 grains per 100 feet of gas, and into No. 2 house it was 14 grains; in other words, the quantity of ammonia in the whole gas which entered the purifiers during this period gives a daily average of 17 grains per 100 feet of gas, while the daily average of sulphur in the purified gas was 42 grains; whereas in the two previous weeks, when a much smaller quantity of ammonia entered the purifiers, the amount of sulphur in the purified gas was lower, viz., 38 grains.

Part II.

The all-important question now arises—What explanation can be given of the utter failure of the sulphur purification at the Beckton works? and how is the failure to be remedied?

As it is obvious from the preceding exposition of the facts of the case, neither money nor pains have been spared in the endeavor to make the purifiers at Beckton as perfect as possible. They are much larger, and the cost of purificat on is much greater, relative to the make of gas, than those in any other gas-work in London or in the world. The Chief Engineer holds the first rank in his profession, and in the other engineers of the company he has assistants whose ability and experience are well known. Moreover, advice has been sought by the company and its officers wherever such advice appeared to them likely to be useful. The disappointing failure of the sulphur-purification in those magnificent works is ascribable entirely to the want of knowledge existing on this important branch of gas-manufacture. Until the referees commenced their experiments, it is no exaggeration to say that nothing was known with certainty on this subject, and that most erroneous ideas were prevalent, as was partly shown in the first sulphur report in 1870. A further report on the same subject is in preparation, wherein the subsequent investigations of the referees will be given.

Causes of the Failure.

The causes of the failure of the sulphur-purification may be classed under two heads; namely, (1.) Probably, some defect in the distillation, whereby an unusual amount of sulphur other than sulphuretted hydrogen is produced in the gas; and (2.) certainly, an almost total failure of the processes of purification as regards this particular impurity.

I.—DISTILLATION.

So far as can be judged from experiments which the referees have made in other gas-works, the amount of "sulphur" in the crude gas at Beckton appears to be larger than is usual. And since, as already explained, the sulphur-compounds found in gas do not exist in any kind of coal, and are generated in the retorts from the sulphur existing in the coal *in other forms*, it appears that if the amount of bisulphide of carbon (or sulphur in other forms than sulphuretted hydrogen) in the gas be larger than usual, it must be owing to some defect in the distillation, tending to transmute into this form the sulphur as it exists in the coal. Or else it must be owing to over-action of the exhausters, whereby some portion of the smoke or flame of the furnaces is drawn into the retorts through the chinks or fissures. The latter explanation, however, appears inadmissible to the referees, as the "hydraulic seal" upon the retorts seems to be as carefully maintained at Beckton as in any other gas-works. Accordingly they cannot but conclude that any defect of the distillation must be owing to some of the retorts being over-heated, thereby driving off a larger portion of the sulphur from the residuary coke than usual—although the *general* temperature of the retorts is considerably lower than in other gas-works. The retorts at Beckton are arranged in sets of nine; thus—

The dotted lines showing the course of the flues from the furnace. In this form of setting, the flame from the furnace must act with extraordinary power upon the middle retort in the lowest row. To a great extent such a defect is unavoidable in every form of setting; and, in order to remedy it, it is the practice to put a larger charge of coal into the retorts where the heat is greatest, to keep down the temperature.

II.—PURIFICATION

(1.) *Carbonic Acid.*—As soon as the result of the experiments and other information given in this report had been obtained by the referees, it appeared to them certain that the cause of the failure of the "sulphur"-purification at Beckton did not lie with the purifiers themselves; and consequently that it must be sought for in the antecedent processes of gas-purification—namely, the condensers and scrubbers. And, besides another defect to be subsequently explained, they fixed upon *Carbonic Acid* as an important and hitherto unsuspected element of the failure.

In their report upon ammonia-purification (laid before Parliament in August last) the referees remarked that the process of cooling and condensing the gas by a long series of pipes placed *underground* (such as was mainly employed at Beckton), although possessing some important advantages, is nevertheless very defective as regards the main work of cooling and condensation, which is indispensable to perfect purification. They pointed out that "if the gas is not properly cooled in the condensers before entering the scrubbers, the absorbent power of the water in those vessels is diminished; while if tarry vapor in large quantity is carried forward into the scrubbers, the scrubbing material (as sometimes happens) may be suddenly 'fouled' to a degree which seriously affects the purifying action of the apparatus." In this statement, as now appears to the Referees, lies the key to the secret or mystery which has hitherto escaped detection at Beckton. The inadequacy of the condensing apparatus (apart from a defect confined to the condensers themselves, to be noticed in the sequel) has hitherto impaired the action of the scrubbers, and this in turn has impaired, or almost neutralized, the action of the lime in the purifiers.

Besides the ammonia and sulphuretted hydrogen, the scrubbers are capable of taking out a large portion of the carbonic acid in the gas; and this is the important point here. The portion of the carbonic acid not taken out by the scrubbers, of course, goes forward with the gas into the purifiers. Now, in the case of lime purifiers, the entrance of carbonic acid is of all things the most detrimental to their action; for it converts the lime into carbonate of lime, which has no effect upon the sulphur in the gas. *Clean* lime also (though quickly absorbing sulphuretted hydrogen) has hardly any action upon sulphur in other form than HS.

It is only when the lime exists as sulphide of calcium that it acts upon "sulphur."

[To be continued.]

Fixing Coal-Tar Colors by Silica.

The affinity of silica for coal-tar colors is asserted to be remarkable. If recently precipitated and well-washed silica is put into glasses containing solutions of magenta, or of the aniline violets or blues, the precipitate seizes upon the color, and retains it on washing with water. Boiling water or alcohol withdraws the color from the silica. The powdery colors thus obtained can be used in painting and paper-staining. Aniline colors can also be fixed upon cotton by the aid of silica. If impregnated with silica or with an easily decomposed silica compound, the cotton takes aniline colors readily. This may be effected by rinsing the cotton goods in a solution of the silicate of soda. It is better, however, to fix the silica in the fiber by first working in the silicate of soda, and then passing the goods through a dilute acid. The cotton is then well washed and worked in a solution of the dye. In this manner the dullness is avoided which never fails to appear whenever aniline colors are fixed upon cotton by the aid of gall-nuts, myrabolans, or any other substance containing tannin. The aniline shades fixed upon cotton by means of silica are remarkably solid, and resist alkalies and soap-lyes better than those obtained on the ordinary plan. Silica is also useful for fixing the aniline greens upon woolens. The goods are worked in silicate of soda, dyed at a hand-heat in a solution of aniline green, and passed through a bath of dilute acid.—*Exchange.*

Report on the Operation of the Gibson Improvement, at the Peoples Works, Williamsburgh.

Record of experimental comparisons at the Peoples Works, corner First and South Eleventh streets, Brooklyn, E. D., under the supervision of the engineer and his subordinates, by special authorization of the Vice President of the company, for the purpose of testing the difference in value between the production of gas from bituminous coals, by the Gibson Valve process, dispensing with the use of the Dip-Pipe; and, that, by the ordinary process of the Dip-Pipe Seal.

W. Henry White, Engineer.
C. C. Willett, Day Weighmaster.
E. G. Van Schaack, Night Weighmaster.
Alfred Theall, Jr., Day Clerk.
Chas. King, Night Clerk.

MARCH 20, 1872, NO. 1 VALVES.

Experiments with *coals—95 per cent. Penn and 5 per cent. Grahamite.* Seven A. M. to seven P. M. *Works all in Gibson Retort Valves;* 29 clay retorts in use—low heats. Exhauster with slight pressure on Hydraulic Main. Four hour charges—average of 175 lbs. each charge. Coal carbonized, 14,900 lbs; gas made, 68,300 cubic feet, of 18·405 average candle power, 4.584 cubic feet per lb., or 10,268 cubic feet per ton of 2,240 lbs., equal to 13,498 cubic feet per ton, equal 6.026 cubic feet per lb. of 14 candle gas.

MARCH 25, NO. 1, DIPS.

Experiment with *coals—95 per cent. Penn and 5 per cent. Grahamite.* Seven A. M. to seven P. M. *Works all in Dipe-Pipe Seal;* 28 clay retorts in use—at high heats. Exhauster at 3 and 5-10ths. Four hour charges—average of 175 lbs. each charge. Coal carbonized 14,430 lbs.; gas made, 67,570 feet of 14.85 candle power; 4·6826 feet per pound, or 10,488 cubic feet per ton of 2,240 lbs., equal to 11,102 cubic feet per ton—4·986 cubic feet per lb. of 14 candle gas.

Result: By average, from *coals—95 per cent. Penn and five per cent. Grahamite,* an *increase* in the value of the *production* of 2,396 *cubic feet* of 14-*candle gas* per ton of 2,240 lbs., by the *Gibson Valve process,* dispensing with the Dip-Pipe seal; or *equal to* 21 and 6-10ths per cent. in favor of the valves.

MARCH 20, 1872, NO. 2. VALVES.

Experiment with *all Penn coals.* Seven P. M. to seven A. M. *Works all in Gibson's Retort Valves;* 29 clay retorts in use—at high heats. Exhauster at vacuo. Four hour charges—average of 160 lbs. each charge. Coal carbonized, 13,620 lbs.; gas made, 67,320 cubic feet of 16.04 average candle-power; 4.9427 cubic feet per pound, or 11,071 cubic feet per ton of 2,240 lbs., equal to 12,684 cubic feet per ton—5.6629 cubic feet per pound of 14-candle gas.

MARCH 25, DIPS.

Experiments with *all Penn coals.* Seven P. M. to seven A. M. *Works all in Dip-Pipe Seal;* 28 clay retorts in use—at high heats. Exhauster at 3 and 5-10ths. Four hour charges—average of 160 lbs. each charge. Coal carbonized, 13,320 lbs.; gas made, 62.130 feet of 15.45 average candle power; 4.664 cubic feet per pound, or 10,447 cubic feet per ton of 2,240 lbs., equal to 11,529 cubic feet per ton—5·1475 cubic feet per lb. of 14-candle-gas.

Result: By average from *all Penn coals* an *increase* in the value of the production of 1,155 *cubic feet* of 14-*candle gas,* per ton of 2,240 lbs. Penn coals, by the use of the *Gibson Valve process,* dispensing with the Dip-Pipe Seal; or *equal to* 10·02 *per cent. in favor of the Valves.*

APRIL 4, NO. 3. VALVES.

Experiment with *coals—95 per cent. Penn 5 per cent. Grahamite* Seven A. M., 3rd, to 7 A. M. 4th. *Works all in Gibsons's Retort Valves;* 24 clay retorts in use—at high heats. Exhauster at vacuo. Four hour charges—average of 160 lbs. each charge. Coal carbonized, 23,040 lbs.; gas made, 120,730 cubic feet of 16.35 average candle-power; 5.94 cubic feet per pound, or 11,737 cubic feet per ton of 2,240 lbs., equal to 13,707 cubic feer per ton—6.12 cubic feet per pound of 14-candle gas.

APRIL 12, NO. 3. DIPS.

Experiment with *coals—95 per cent. Penn and 5 per cent. Grahamite.* Seven A. M. 11th to seven A. M., 12th. *Works all in Dip-Pipe Seal;* 24 clay retorts in use—at high heats. Exhauster at vacuo. Four hour charges—averaging 176 lbs. each charge. Coal carbonized, 25,344 lbs.; gas made, 119,970 cubic feet, of 15.34 average candle-power, 4.7336 cubic feet per pound, or 10,603 cubic feet per ton of 2,240 lbs., equal to 11,618 cubic feet per ton—5 1867 cubic feet per pound of 14-candle gas.

Result: By average from *coals—95 per cent. Penn and 5 per cent. Grahamite,* an *increase* in the value of the *production* of 2,089 cubic feet of 14-*candle gas,* per ton of 2,240 lbs. coals, by the use of the *Gibson Valve Process* dispensing with the Dip-Pipe Seal; or equal to 18 per cent. *in favor of the Valves.*

RECAPITULATION.

	Coal.	Gas.	Candles	Cu. ft. per lb. of coal	Gas at fourteen candles.
No. 1, Valves.....	14.900 lbs.	68.300 cu. ft.	18·405	4·584 =	80,790 cu. ft 6·027 per lb.
No. 2, Valves.....	13.620 lbs.	67.320 cu. ft.	16·04	4·9427 =	77,129 cu. ft. 5·6629 per lb.
No. 3, Valves.....	23.040 lbs.	120,730 cu. ft.	16·35	5·24 =	140,995 cu. ft. 6·12 per lb.
	51.560 lbs.	256.350 cu. ft.	16·816	4·9719	307.914 5·9574
No. 1, Dips.....	14.430 lbs.	67.570 cu. ft.	14.82	4.6826 =	71,956 cu. ft. 4.986 per lb
No. 2, Dips.....	13.320 lbs.	62.130 cu. ft.	15.45	4.664 =	68,565 cu. ft. 5·1475 per lb.
No. 3, Dips.....	25.344 lbs.	119.970 cu. ft.	15.34	4.7336 =	131,453 cu. ft. 5.1867 per lb.
	53.094 lbs.	249.670 cu. ft.	15.22	4.702	271,974 cu. ft. 5.1225

The Valves are a saving of 17 per cent. of the coal used with the Dip-Pipes; or, at 14 candles, a general average in favor of the valves of 17 per cent—equal to

.8349 cubic feet increase of production per pound of coal used. The above record is a true statement.

[Signed.] W. HENRY WHITE, Engineer.

BROOKLYN, April 12th, 1872.

[NOTE.—Through carelessness on the part of the copyist who furnished the manuscript for the hands of the printers, a large amount of unnecessary italic has been introduced.—PUBLISHER.]

A New Sensitive Singing Flame.

By W. E. GEYER, of the Stevens Institute of Technology.

Philip Barry has recently described* a very sensitive flame produced by placing a piece of ordinary wire gauze on the ring of a retort stand, about four inches above a Sugg's steatite pin-hole burner, and lighting the gas above the gauze. "The flame is a slender cone about four inches high, the upper portion giving a bright yellow light, the base being a non-luminous blue flame. At the least noise this flame roars, sinking down to the surface of the gauze, becoming at the same time almost invisible. It is very active in its responses, and being rather a noisy flame, its sympathy is apparent to the ear as well as to the eye."

A simple addition to this apparatus has given me a flame, which, by slight regulation, may be made either: (1) a sensitive flame merely; that is, a flame which is depressed and rendered non-luminous by external noises, but which does not sing; (2) a continuously singing flame, not disturbed by outward noises; (3) a sensitive flame, which only sounds while disturbed; or (4) a flame that sings continuously except when agitated by external sounds. The last two results, so far as known to me, are novel.

To produce them it is only necessary to cover Barry's flame with a moderately large tube. resting it loosely on the gauze. A luminous flame six to eight inches long is thus obtained, which is very sensitive, especially to high and sharp sounds. If now the gauze and tube be raised, the flame gradually shortens and appears less luminous, until at last it becomes violently agitated, and sings with a loud uniform tone, which may be maintained for any length of time. Under these conditions, external sounds have no effect upon it. The sensitive musical flame is produced by lowering the gauze, until the singing just ceases. It is in this position that the flame is most remarkable. At the slightest sharp sound it instantly sings, continuing to do so as long as the disturbing cause exists, but stopping at once with it. So quick are the responses, that by rapping the time of a tune, or whistling or playing it, provided the tones are high enough, the flame faithfully sounds at every note. By slightly raising or lowering the jet, the flame can be made less or more sensitive, so that a hiss in any part of the room, the rattling of keys, even in the pocket, turning on the water at the hydrant, folding up a piece of paper, or even moving the hand over the table, will excite the sound. On pronouncing the word "sensitive," it sings twice; and in general it will interrupt the speaker at almost every "s" or other hissing sound.

The several parts of the apparatus need not be particularly refined. By the kindness of President Morton, I have used several sensitive jets of the ordinary kind made of brass; they all give excellent results. Glass tubes, however, drawn out until the internal diameter is between one sixteenth and one thirty-second of an inch, will do almost equally well. For producing merely the singing flame, even the inner jet of a good Bunsen burner will answer. The kind of gauze too is not important; I have generally used a piece which had been rounded for heating flasks; it contained about 28 meshes to the inch.

The tube chiefly determines the pitch of the note, shorter or longer ones producing, of course, higher or lower tones respectively. I have most frequently used either a glass tube twelve inches long and one and a quarter inches in diameter, or a brass one of the same dimensions. Out of several rough pieces of common gas pipe, no one failed to give a more or less agreeable sound. Among these gas pipes was one as short as seven inches, with a diameter of one inch: while another was two feet long, and one and a quarter inches in diameter. A third gas pipe, fifteen inches long and three quarters of an inch in diameter, gave, when set for a continuous sound, quite a low and mellow tone. If the jet be moved slightly aside, so that the flame just grazes the side of the tube. a note somewhat lower than the fundamental one of the tube is produced. This sound is stopped by external noises, but it goes on again when left undisturbed. All these experiments can be made under the ordinary pressure of street gas, three-fourths of an inch of water being sufficient.—*Am. Jour. of Science.*

HOBOKEN, March 18, 1872.

* Nature, v. 30, Nov. 1, 1871. [This form of apparatus would seem not to be original with Mr. Barry, since identically the same thing, apparently, was described months earlier by Prof. Govi, of Turin, and noticed in the September number of the *Moniteur Scientifique.*—EDS. *Amer. Jour. Science.*]

Gas from Sewage and Faecal Matters,

Abstract from "Engineering."

Of all the processes for the manufacture of sewage into poudrette there is only one process in which it is attempted to use the gases evolved during the carbonization. This is known as Hickey's system. The features of this process are the collection of the gases from carbonization, which he purposes to use for illuminating purposes; while the poudrette remaining is an excellent deodorizer, and when mixed with the ammoniacal liquor from gas works, is a valuable manure. Water carriage for sewage is opposed to the use of the carbonization process when the gas is to be collected.

The destruction of sewage by fire is one of the oldest methods, and has been used in India. Making burning gas from sewage was experimented upon in Paris in 1786, and in 1841. Boussingault and Payen prepared an odorless manure, which contained in 1000 parts 29·6 per cent. of nitrogen against 12·4 in its natural state. The process is now practiced in France by Mr. Salmon. The sewage is mixed with a certain amount of poudrette to deodorize it. The mixture is then placed in hermetically sealed vessels, and the escaping gases are used for heating, by introducing them into the furnace.

"The desire to make the disposal of sewage absolutely remunerative to the community, is, we think, a mistake. The one great end is to remove what would else be a nuisance; it is therefore a convenience which may justly be expected to be paid for." It has however a value, and it should not be left to run to waste, but be converted into a useful form by what means may be expedient, and within the limits of excessive cost. Many maintain water carriage to be unfitted for hot climates. This is now being tested in India, and in the Madras presidency the dry earth system has been in use since 1863. Mr. Hickey's plan is more modern, and has hardly yet gone beyond experiment. Trials have been recently made in India on a small scale, and it has been proved that converting sewage material into coke and gas is perfectly practicable.

The amount of gas per 1000 inhabitants per day, raised to 870° Fah. was 1156 cubic feet, which burnt with a pale light, and with a power of 2½ candles, possessing a value of 3s. per 1000 persons. The amount of charcoal remaining in the retort was 39 lbs. per 1000 persons, valued at 1s., and 2 lbs. of ammonia were produced. The total value of the products per 1000 persons per day was 4s., with a cost for coal alone of 8s. The gas had the following composition:

Hydrogen	35·36
Marsh gas	31·28
Olefiant gas and other heavy carburetted hydrogens	2·40
Carbonic oxide	21·74
Carbonic acid	9·06
Phosphuretted hydrogen, trace—say	0·22
	100·00

The poudrette remaining after making the gas, seems to be better than earth for the ordinary dry earth conservancy, which absorbs 30—35 per cent. of moisture, while Hickey's poudrette absorbs 100 per cent.—*Amer. Chemist.*

A MAGNETIC LOCK.—B lock of this description has been adopted, we are informed, in some of the English collieries, with a view to prevent miners and others employed in the collieries from opening their lamps with forged keys and other implements. The lamps are self-locking, and cannot be opened save by aid of a powerful magnet, in the possession of the lamp-keeper. The invention is said to be applicable to any form of lamp, and to cost about a shilling. Any device by which the miner's lamp could be closed entirely, except to some authorized person, would be a source of great safety.—*Jour. Franklin Institute.*

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—ED.

A Refutation.

TERRE HAUTE, IND., June 22, 1872.

Mr. Editor: In your issue of May 2, is a communication from George W. Gift, which does injustice to the Philadelphia gas works, and should therefore be corrected. He says "the coal used during 1871 amounted to 157,453 tons, from which 1,338,972,000 cubic feet of gas was made, showing the average yield for the year to have been about 3.8 cubic feet to the pound of coal.—very indifferent coal, I should say."

In this quotation he does injustice to the coal, as well as to the gas company, for the coal used is in all probability the Penn and the Westmoreland Gas Companies coals from near Pittsburg, which are considered as good as any ordinary gas coals used in the United States.

The yield at the Philadelphia gas works is, however, instead of 3.8 cubic feet, actually 4.25 cubic feet to the pound of coal; this is, in my opinion, rather a small yield for these excellent gas coals, as I believe that under judicious carbonization they will yield at least on the average 4.33 cubic feet to the pound, if the coal has had the least chance to dry by being placed under shed, say for a month or two before being carbonized. Mr. Gift's error is occasioned by his carelessness, which in this case is very culpable, as he should have used a reasonable degree of care before criticising so rashly the doings of others, and thus injuring their reputation—in not noticing the fact that the report says: Net tons; thus 157,453 tons × 2000 lbs. = 314.906,000 ÷ 1,338,972,000 = 4.25 + cubic feet. There are one or two other inaccuracies in his letter, which lead a person to be a little cautious about accepting the conclusions he so rapidly reaches.

There is one point mentioned above which gas companies do not take sufficient note of—that is, the deterioration of gas coals, *or rather, the reduction of yield*, resulting from their being used as soon as taken from the mine, or when exposed without cover to the action of the elements. I have frequently seen thousands of tons at the Cincinnati gas works and at other points, without covering of any kind.

In a geological report of the State of Illinois I found these remarks, which will prove of interest to all thinking gas superintendents, and in all probability, if heeded, will be a source of profit to many gas companies, who are apt to give too little attention to these items, which they consider matters of minor importance.

"The amount of moisture in coal is always greatest at the time of removal from the mine, *excepting of course*, after exposure to melting snows or soaking rains."

I have seen retorts in Philadelphia and elsewhere, charged many a time with snow, and in fact lumps of ice through the coal, sufficient to check the heat to such a degree, that the escaping gas, while charging, would scarcely blaze out at the mouth of the retort.

"For most purposes, all coals improve in value by exposure, *under cover*, to a free circulation of air. This process of 'seasoning' permits the escape of a large proportion of the mechanically retained moisture. There is a great difference in the capacity of different coals to retain moisture, even after long seasoning; and its retention to any large amount must be considered as a detraction from the merits of the coal.

"There can be no doubt but that the presence of water in any coal diminishes, to a great extent, the amount of illuminating gas which it would otherwise produce."

[I would remark in passing, that with retorts in the condition I have represented above, the coal saturated with snow and with lumps of ice through the mass, that William Wallace Goodwin, or any other man, would be somewhat bothered in generating large quantities of gas by introducing superheated steam on the Elmer process.]

"From experiments made in France by M. Penot, the following results were obtained:

One kilogram of caol containing 10 per cent of water gave

Gas of good quality	160	litres
" poor quality	92	"
	552	"

The same coal, previously dried, gave

Gas of good quality	240	litres
" poor quality	92	"
	332	"

The difference of the product of gas, due to the presence of 10 per cent of water is 80 litres; a little over 24 per cent, and it is to be noticed that the gas of poor quality is the same in both cases, *the whole loss being in gas of good quality.*"

Now these are solemn facts, which are confirmed by the every day experience of gas men, yet they do not think enough of these important items to secure the results thus indicated.

In your last issue, March 16, I see you give a slight notice to the admirable phonographic report of the trial in Louisville between Fuller and the Louisville Gas Company. I was fortunate enough to receive a copy when first issued, and I heartily endorse your recommendation of the work to all our gas engineers and superintendants. It contains a great deal of valuable information in reference to the meter, and no gas man should be without it. Mr. Harney must have felt severely rebuked, when he came as a scientific expert, on whose affidavit the whole case had been brought before the Court, and was there compelled to admit that he had only taken into the account one half of the action of the meters.

The triumphant manner in which Mr. Hermany, the engineer of the water works, sustained the accuracy of the meter under the examination of the learned counsel, and the manly manner in which he met and repelled the searching cross-examination, which at one or two points almost amounted to badgering, must meet the approval and admiration of all who purchase and read this admirable defence of the two diaphragm dry meter, which really was the meter in dispute before the Court, although the three diaphragm or De Frees meter, was the one chosen by Mr. Harney to illustrate the case, which he supposed he could make out and sustain against the gas company; and in which he so ignominiously failed.

Prof. J. Lawrence Smith, the president and engineer of the gas company, deserves the thanks of the gas fraternity for preserving and printing this valuable addition to the gas literature of the day.

The depositions of Messrs. Stimpson, Hopper, and Wormley, contain a great deal of valuable information for those who wish to study the gas meter. The cross examination of Mr. Hermany, in reference to the meter prover is also very interesting reading. Every gas company shauld secure a copy, especially at the extremely low rate at which it is supplied. It is quite large, having 142 pages of matter. R.

The Gibson Valve.

SELMA, ALA., May 23, 1872.

Mr. Editor: I see by your Journal of May 16, page 171, an advertisement headed "Caution," from the American Coal-Gas Light Improvement Company; John H. Blake, President; wherein he says that al contrivances are infringements on patents owned by said company. I have these claims, and Gibson claim a valve to cut off between the retort and the hydraulic main. I am aware of six or eight different patents that will give the same results, in different ways, but Gibson's and all other claims work on the present hydraulic main.

Now, in my claim, I don't interfere with the present hydraulic main in any way, so he cannot surely include my contrivance. If he does, I will deposit in the office of your Journal $100, they doing the same; I will select one man and they another, and those two men shall select three, five, or more experts in gas matters to decide on my claim; if they decide against me I will forfeit my $100, and if not sufficient $100 more, also the patent. This plan, so far as I am concerned, will be better than to scare gas companies, for I don't scare worth a cent. I have not as yet brought my patent into notice but to a few. I would like you to get an engraving made of it, and publish it in your issue of June 16.

Yours respectfully,

CHARLES COLLIER.

The Ohio Geological Survey.

Prof. Newberry's treatise on the lower coal measures in N. E. Ohio, embodies several very important discoveries. It appears, for instance, that these Ohio coal measures form, not one basin or series of strata dipping uniformly S. E., but several parallel troughs. This circumstance is so important that its establishment and explanation are worth to the rising industry of the State the whole cost of the survey; for it follows from this trough-like arrangement that workable beds (like the Briar Hill coal) do not dip at once so far beneath the surface as to be, except along a limited strip of territory, practically inaccessible, but repeatedly approach or run parallel with the surface. In this way the Briar Hill coal is proved to be within easy reach, along many valleys where it has been represented as virtually lost in depth. It is also shown that the number of coal seams below the Barren measures has hitherto been erroneously duplicated; that there is no break at the Hanover summit, and that the Salineville coals are in reality identical with the highest seams of Hammondsville and Linton, immediately under the Barren measures. In connection with these structural peculiarities, Prof. Newberry is prepared to find, though too cautious to assert as yet, that the valleys of the Ohio and its main tributaries have been determined by the same causes that produced the great folds of the Alleghany mountains. All these valleys, by the way, are cut far below the present stream beds, and filled up again to depths of 150 or 175 feet and more.—*Engineering and Mining Journal.*

Gas and Paraffine-Oil in Lighthouses.

Some further correspondence between the lighthouse authorities and the Board of Trade has been published, relative to proposals to substitute mineral oils for colza in lighthouses. It is unnecessary for us to notice the rival lamps proposed for the consumption of the former, respecting which a good deal of unpleasant feeling is exhibited in the correspondence. Both, however, it is clear, admirably fulfil their purpose, and the adoption of either would effect a very large saving in the cost of our lighthouses, with the additional advantage of a more uniform light. According to Mr. Douglass, the experiments made at the Trinity House, the cost of the the light from paraffine oil is 72.7 per cent. less when produced by the Argand or single-wick lamp, and 60.5 per cent. less when produced by the four-wick lamp, than colza oil. The lamps with paraffine oil give a more uniform light throughout the night without trimming, are more readily ignited, burn with greater certainty, and require less attention than lamps consuming colza. The paraffine can also be arranged for increasing the light when the weather requires it. These statements are perfectly in accordance with those made by Dr. Macadam, who experimented with the Doty lamp, who gives an interesting table, in which the total light derived from one gallon of the respective oils is expressed *in pounds of sperm.*

			Paraffine.	Colza.
1st. order	4-wick	lamp.....	22.77 lbs.	21.26 lbs.
2d. "	3	"	26.46 "	19.21 "
3. "	2	"	27.04 "	17.49 "
4th "	1	"	27.15 "	14.57 "

The rival lamps we have alluded to were preferred to Dr. Tyndall to decide on their merits, and his report claims a slight preference for that of Captain Doty. But while acknowledging the merits of paraffine, Dr. Tyndall calls the particular attention of the Board of Trade to the advantages of the use of gas in lighthouses. "Gas," he says, "has been successfully applied in certain lighthouses in Ireland, and I think any practical mariner must see that the special handiness with which gas lends itself to the purposes of a signal-light is a very strong point in its favor. Until we know what gas can do, it would be unwise to make a sweeping alteration in favor of paraffine. Paraffine may, and probably will, be proved cheaper than gas; but cheapness is only one element of the probleu. If it can be shown that a gaslight, owing to its demonstrable flexibility, can give the mariner more definite warning, and more certain guidance, then it becomes a question whether these advantages might not be wisely purchased by a little additional outlay. The Elder Brethren are preparing to give gas a trial at Halsborough, and, until this trial is ended, no contract, involving an entire change in our system of lighting, ought, in my opinion, to be made."—*Lond. Jour. of Gas-Lighting*

Notes on American Asphaltum.

By Professor J. S. NEWBERRY.

All my observations on asphalts have resulted in the conviction, that without exception they are more or less perfectly solidified residual products of the spon taneous evaporation of petroleum. In many instances the process of formation of asphalt may be witnessed as it takes place in nature, and in our oil stills we are constantly producing varieties of asphalt. These are in some instances, undistinguishable from the natural ones, and in general differ from them only because our rapid artificial distillation at a high temperature differs from the similar, but far slower distillation that takes place spontaneously at a low temperature.

Asphaltum occurs in America, as does petroleum, in an immense number of places. So many that I cannot enumerate even one-half of those known to me. I will however notice a few of the most interesting. The asphalt from these various localities exhibits great diversity of physical character, and some, of chemical composition. These differences are doubtless, in part, due to differences in the petroleums from which they have been derived. The greatest noticeable diversity is, however, probably due to difference of age, and is a record of the slow but constant changes which time affects in these, as in other organic compounds.

Among the most important of our asphaltic minerals are the Albertite and Grahamite. The first from New Brunswick, the second from West Virginia. Both these are found filling fissures, opened across their bedding, in strata of carboniferous age. The geology of the districts where these deposits occur, has been described by Professors Dawson and Lesley, and it is unnecessary now to repeat the details which they have given. Suffice it to say that the fissures filled by both the Albertite and Grahamite mark lines of disturbance, where the strata are more or less tilted and broken, and where oil springs abound. There is little room for doubt that in each instance, the fissures which contain the asphalt have afforded convenient reservoirs into which petroleum has flowed, and from which all the lighter parts have been removed by evaporation. A large number of similar deposits though of less magnitude are known to me, all presenting the same general features. Among these I may mention, a nearly vertical bed in mountains west of Denver, in Colorado. This is a fissure filled with an asphalt which I submitted to Prof. Henry Wurtz for examination, and which he has shown to be not essentially different from Grahamite. On the banks of the Arkansas, south from Denver City, a number of smaller fissures cutting cretaceous rocks, are filled with a similar asphaltic mineral. In the great Devonian black shale of Ohio and Kentucky (Huron Shale) fissures cutting across the bedding of the formation, filled with Albertite, occur near Avon Point, Lorain Co., Ohio, and Liberty, Casey Co., Kentucky. Petroleum flows from this formation nearly everywhere along its line of outcrop. The asphalt from all the localities I have cited, is hard, bright and brittle, and seems to be the product of very long continued and complete spontaneous distillation and oxidation.

In southern California, western Canada, central Kentucky and Chicago, etc., asphaltum may be seen in the process of formation from petroleum. In Enniskillen, Canada, an abundant flow of dark and heavy oil has produced large accumulations of more or less perfectly formed asphalt at the surface. These are locally known as gum beds. They attracted the attention of Mr. Williams in 1860, when the distillation of oil from cannel coal, bituminous shales, etc., was expanding into an important industry, and he established an oil distillery there for the use of this material. On cutting through the crust of the solidified asphalt, semi-fluid and finally fluid petroleum was met with, afterward these oils yielded immense quantities of petroleum. In Butler Co., Kentucky, the central member of the Lower carboniferous group is saturated with petroleum. This flows out from the cut edges

[*For continuation see page* 180.]

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AND

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MONDAY, JUNE 2, 1872.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

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THE GIBSON IMPROVEMENT: ITS PRESENT STATUS.

In former pages we have called attention to the very great saving effected by this Improvement; and have given results at the works of the Gas-Light Company in Cambridge, Mass., where this plan was first successfully demonstrated. and the great advantage thereby to be obtained was first proved. The result of all of these trials, with various kinds of coal, and varying weights of charges in the retorts, showed a gain of over one foot to the pound. A gain attributable only to the doing away with the intermittent pressure caused by the dip-pipe seal.

Similar trials have more recently been made elsewhere, with similar results. Some of them with great care, by and under the supervision of experts, whose authority in such matters will not be questioned, or their testimony doubted by Gas-Managers. We give below the reports of some of the earliest trials, in order that they may be compared with the more recent ones, made in other places, which form the principal part of this article.

Average result of trials reported by Mr. Gibson, in Cambridge, using clay retorts in connection with an exhauster.

Coal.	With dip-pipes. Feet per lb.	With retort valves. Feet per lb.
Westmoreland.....	4.45	5.77
Caledonia.....	3.65	4.62

Averages at Cambridge, by Mr. Edward Jones, Engineer of the South Boston Gas Works, assisted by Mr. Alfred W. Norton, of the East Boston Gas Works, and Mr. Thomas J. Pishon of the Roxbury Gas Works, Boston Highlands, in 1871.

Coal.	With dip-pipes. Feet per lb.	With retort valves. Feet per lb.
Westmoreland.....	5.11	6.28

In January, 1872, the South Boston Gas-Light Company having adopted the Gibson Improvement, Mr. Jones made a series of trials, from the first to the 22d day of the month. At these works the arrangement of the benches is as in most modern works, each bridge-pipe being connected with a dip-pipe entering half an inch below the level of the liquid in the hydraulic main, the only difference being, that each of the latter pipes is provided with a valve, which terminates at the upper part of the main, so that, when the valve is open, no gas passes through the dip-pipes. There are six clays in each bench, and the retorts were new. The exhauster was maintained at zero, during the whole time, and the temperature of the retorts and the quality of the coal carbonized were as uniformly the same as possible. For the photometric tests, which were made each half hour during the time of the trials, the gas was drawn from the inlet-pipe of the station meter It is to be especially noted that at the South Boston gas works the area of the opening into the main of the dip-pipe is 19.6 inches, while the pipe in which the valve is placed has an area of only 4.9 inches; consequently the gas passing through the dip-pipe has about four times more room for its passage than when passing through the valve-pipe.

The average result of these trials was, with a mixture of Penn and Lingan, with dips 4.39, and with valves, 5.69 feet per pound.

During the months of March and April careful trials to determine the value of the Gibson Improvement, for the saving of coal effected by it, were made at the works of the Peoples Gas Light Company, in Brooklyn, N. Y., by Captain W. Henry White, Engineer, and his assistants. There were in all, six trials, four of twelve hours, and two made occupying twenty-four hours each, three trials with retorts with valves, and three with retorts with dip-pipes. The illuminating power of the gas made, was carefully determined, not only within the works, in its passage from the retorts to the station meter, but as drawn, also, from a street main, at a point more than a mile distant from them. The Report of Captain White, upon these trials is printed by us in full in other columns. The Editor of this Journal was present during a great part of the time, verified many of the photometric tests, and convinced himself of the perfect fairness, to all parties, of the whole proceedings.

The whole average results may be thus summed up:

Coal.	With dip-pipes. Per lb. of coal.	With retort valves. Per lb. of coal.
95 p. c. Penn.... / 5 p. c. Granamite	5.12	5.95

A number of the retorts used in these trials were said to be old, and more or less filled with hard carbonaceous deposits. The weight of the charges of coal in the retorts with valves and dip-pipes was as follows:

In the first trial, each retort was charged with 175 lbs. of coal, and in the second, 160 lbs., while in the third the retorts with valves were charged with 160 lbs. each, and then with dip-pipe, 176 lbs. each, to demonstrate the fact that 10 tons coal with valves are more than equal to 11 tons coal carbonized with the dip-pipe.

It will be observed that in making the before mentioned trials, the yield of gas per pound of coal in the retorts with dip-pipes, was greater than is usually obtained, and it is to be presumed that care was taken to get the best results possible. There was certainly no inclination on the part of the officers of the company to favor the Gibson Improvement, which was applied, shortly before his death, by the late Col. White then in charge of the works.

This has at least been inferred, because immediately after his death, these officers gave orders for its removal, and were indisposed to have any trial made. They afterwards, however, authorized the trials before mentioned, the result of which we have given.

We have been furnished with the figures of still other recent tests, but these must go over to another occasion, together with our comments on the subject.

AMERICAN "ASPHALTUM."

On another page will be found an article upon this subject, in which "the law is laid down" by an authority ranking so high, that many will doubtless regard it as conclusive. Nevertheless, for the reason that in scientific controversy, as in revolutions, we should always press forward, should be "*toujours audace*," and never be backward in combatting what is deemed retrograde; the Editor of this Journal must venture to maintain, with all his limited capacity, his own convictions, as often before set forth, on some of the points herein involved. The subject is one quite appropriate to these columns, since the materials included by Prof. Newberry under the term "asphaltum" are becoming of the first importance (as enrichers) in the manufacture of gas. Some sort of *classification* therefore, of these bodies, becomes almost essential to the proper study of them. Doubtless Dr. Newberry himself would concur in this proposition, although the obvious tendency of his article is to produce and promote the conclusion that all attempts at such classification must needs be futile

and impossible, since all solid carbohydrogen minerals, according to him, are derivatives of native liquids, and a'l such native liquids are "petroleum."

He throws together thus the Albertite, Grahamite, Chapapote, Trinidad pitch, and numerous other minerals; including, for example, as must be inferred from his general tenor, such things as the Dead Sea "Zopissa," Caxitambite, Guyaquillite, Berengelite, the material of asphaltic schists, Wollongongite, mineral resins, etc., etc. Thus we are forced to consider as alike in geological and chemical origin, materials which differ as much from each other, in many respects, as (for example) sugar and starch, camphor and naphthaline, gum dammar and amber, and so on. Why Dr. Newberry does not go still further, and maintain, with Prof. Chapman of Toronto, that coals are also from petroleum, is not in fact apparent. Many of his so-called asphaltums differ more in nature from each other than they do from coals. Albertite, for example, is scarcely appreciably soluble in menstrua which instantly and totally dissolve Grahamite. In the very issue of the Journal in which this paper appears, Dr. S. D. Hayes points out that Trinidad pitch will yield *no paraffine*, while the other "asphaltums" yield it largely. Indeed, there is no end to the *chemical* arguments against these assumptions of Dr. Newberry. With regard to Grahamite, the present writer feels qualified to state from personal observation, that the strata enclosing it are *not* "more or less tilted and broken." Prof. Lesley, whose account is cited, states that he did not visit this locality, but only had specimens. As to the idea that either the Albertite or Grahamite fissure had been filled with liquid oil, which concreted into the solid now formed, we thought Prof. Peckham had given the quietus to this preposterous hypothesis, in *Am. Jour. of Science* for November, 1869. (See also this Journal for December 2d, 1869, p. 164). Prof. Peckham there cites the writer's testimony about the angular "horses" found imbedded in the Grahamite (as also in the Albertite), which a liquid could not have not borne up. He asks, "what held the walls asunder while the oxidation ("inspissation" being a senseless and meaningless term) was in process;" also, "what has become of the remainder of which these enormous masses are only the residua?"

This would amount to at least twenty times as much. "Is it probable that so vast a quantity would leave only traces?" It seems in fact idle, in the present state of our knowledge, to follow up such a discussion. Any theory which will receive the acceptance of chemists, must, as we believe, cover explanations of the formation of coals and cannels, marsh gas and carbonic acid, mineral resins and resinoids, resinous bituminous and asphaltic shales, lignites, and, in general, all that wide range of minerals which we have *provisionally* designated as "Apozoic"; even graphite and the diamond being doubtless products from the same original materials, which it would nevertheless be totally unscientific to claim as belonging therefore to the same species or family.

AMERICAN INSTITUTE OF MINING ENGINEERS.

This Association has been in session in New York during the latter part of the last month, and a number of the subjects discussed come more or less within our scope, but as our valued exchange, the *ngineering Eand Mining Journal* will doubtless present full reports, we shall await these. Our present object is to refer to an extremely pleasant reception of this body, at which we were ourselves fortunate enough to be present. This was at the new Stevens Institute at Hoboken. Many pieces of the magnificent apparatus of this Institution had been put in order with care by the gentlemen of the Faculty to exhibit some of the most beautiful phenomena in the range of Physics and Chemistry. Prof. Morton's Induction Coil, already figured and described by us, was projecting its flashes of mimic lightning; beautiful exhibitions were given, by means of polarized light, of the internal effects of different strains on beams, etc.; Prof. Mayer showed, with his two gigantic electro-magnets, the famous experiment of the resistance of the polarized oxygen, in the open magnetic field, to a disc of copper; and then building a bridge of loose nails across this field, stood up on the same! Many other brilliant things were shown; and then the assembled guests accepted the invitation of the Rev. S. B. Dod, one of the Trustees, to a sumptuous entertainment at the Stevens Place, at Castle Point; where one of those scenes of lavish hospitality was re-enacted, which have been so long associated with the residence of the founder of the Stevens Institute.

SINGING FLAMES.

It will be observed that we have copied to-day an account of some new observations on singing flames, by Mr. Geyer, of the Stevens Institute. In connection with this subject there has come up a controversy regarding priority of invention of the new and highly curious form of *sensitive flame*, in which a sheet of wire-gauze is employed; in which controversy we have ourselves become somewhat involved. This happened in consequence of our insertion of an item from some exchange, attributing the invention to Govi, of Turin, whereas, as will be remembered (see this Journal for May 2d), a gentleman belonging to our fraternity, Mr. Barry, Gas Examiner at Cork, Ireland, has written us a letter in which he reiterates his own exclusive claim to the invention. The Editors of the *Am. Jour of Science*, in a note to Geyer's paper, now insist again on Govi's priority, and the question must be left for the future to decide. We have again written to Mr. Barry, and shall await his reply.

Our present object is to say that we have had the pleasure of witnessing Mr. Geyer's new experiments ourselves, he having exhibited them, at our suggestion, at the meeting of the Lyceum of Natural History on the evening of Monday, May 27th. The experiments were very successful, though extemporized; the flame being made to sound by a whistle, or hiss, the rattling of keys, and so on, at the distance of the whole length of the hall; and singing an accompaniment to a tune. The result is so easy that any one may reproduce it and we commend it as a parlor experiment, for the amusement and instruction of children, of all ages up to fourscore and ten.

STERRY HUNT, IN BOSTON.

Those among us who have been aware of the fact that this eminent chemist is an unmitigated Yankee, "dyed in the wool," have grudged to the Canucks their long appropriation of so eminent an American scientist. Prof. Hunt is about to return, as we are enabled to announce, to become, we trust, a permanent citizen of the land of his birth; having been appointed Professor of Geology and Mining in the Massachusetts Institute of Technology. Why have our pretentious New York Institutions of Learning lost the opportunity of securing so valuable a man?

☞ AN ACCIDENT.—We learn that Mr. W. W. Goodwin of the firm of Harris & Bro., who resides in Camden, while looking at the ruins of Dr. Jayne's building, on Dock street, Phila., Tuesday, May 21; was knocked down by a passing wagon and had one of his legs broken and received other injuries. He was at once conveyed to his home in Camden; and we learn further that he is doing well.

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CAUTION.

SEVERAL CONTRIVANCES HAVING BEEN DEVISED for the purpose of dispensing with the dip-pipe seal, by means of a valve, or cut-off, between the retort and the hydraulic main, in gas works, since this method of making gas was introduced by the AMERICAN COAL GAS LIGHT IMPROVEMENT COMPANY, all of which are infringements upon Letters Patent, numbered 95,459—116,450—and 119,135, owned by said Company. All Gas-Light Companies are cautioned against the use, without license or authority from the undersigned., of said devices.

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[*Continued from page* 177.]

of the formation in the valley of Green River and its branches, forming sheets of mineral tar and ultimately asphaltum which cover the exposed surfaces of the rock. The quantity of asphaltic material in this vicinity is large, and it may sometime be utilized for road making in the same manner as the Seyssel asphalt.

In southern California, the accumulations of asphalt on the coast at Santa Barbara, San Luis Obispo, etc., have attracted the notice of all travelers, who have visited that region. The asphalt is here plainly inspissated petroleum. It drips from the cliffs at many points and forms a scum on the ocean off the coast. There it is evaporated and oxidized, then thrown upon the beach by the waves, where it accumulates in large masses, generally mingled with sand and other foreign matter. When pure, the asphalt of California resembles that from Trinidad and is beginning to be used for the same purposes, roofing, paving, lining of cisterns, etc. The wants of the entire western coast can be easily supplied from this source. About Chicago, Illinois, the Niagara limestone is in some localities completely saturated with a thick petroleum, which on exposure is converted by evaporation into asphalt. There are no important asphaltic accumulations here, and it is perhaps a little doubtful whether the hydrocarbon which fills the limestone, is not too oily to serve the same purposes as the bitumen in the limestone of Val de Travers. But I know of no asphaltic limestone which approaches nearer to the foreign variety now so largely used, and it is quite possible that with appropriate treatment others may be utilized in the same way.

The above list includes all the important deposits of asphaltum in our country of which anything definite is known. At various points in the far west, occur what are known as "tar-springs," really oil springs, around which more or less asphaltum accumulates as the result of evaporation. In Texas, south from Shreveport, a pitch lake is spoken of, in which are said to occur large quantities of bitumen. But of this almost nothing is known.

In anticipation of a great demand for asphaltum for the uses to which it is so extensively applied in Europe, I have endeavored to ascertain the quality and quantity of all of the asphaltic materials found in our country, and with the exception of the Albert mine, have visited all of the localities described in the above notes. The result of my observations has been the conviction, that aside from the Albertite and Grahamite, which from their peculiar character, will but partially supply our want of asphaltic material, we must look to Trinidad as a source from which we are to obtain the greater part of our asphalt. The quantity existing there is inexhaustible. The quality is such that it will with proper treatment do all that asphalt will anywhere do, and it is so accessible and its transportation to our sea-ports so inexpensive, that it should be furnished from this source to our Atlantic cities, at a much less price than asphalt brought from any point in the interior must cost.—*Amer. Chemist.*

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[Reported Expressly for this Journal.]

June 3, 1872

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Kirkless Hall	12 50	@	13 00
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Newcastle Gas	$7 50	@	7 75
Liverpool caking	7 25	@	7 10
British Province Coals.			
International—At Mines, $2 00 in currency			— —
Block House—At Mines, $1 50, Gold			6 25
Little Glace Bay—At Mines, 1 60 Gold			— —
Pennsylvania Coals.			
Penn Gas Coal—Delivered in New York	$6 87½	@	7 10
Westmoreland	6 87½	@	7 10
Shafton	7 10	@	— —
Youghiogheny	7 25	@	0 00
West Virginia Coals.			
Murphy Run	$6 75	@	0 00
Despard	6 75	@	0 00
West Fairmont	6 87½	@	7 00
American Gas Coal	6 62½	@	6 75
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Newburgh Orrel	6 75	@	0 00
Pinnicklinick	6 75	@	0 00
Cloverhill of Virginia	5 25	@	5 50
McKenzie Compound Mixture			8 00
American Cannel Coals.			
Peytona of West Virginia	$14 00	@	14 50
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American Cannel	$10 00	@	10 50
Asphalts.			
Albertite of New Brunswick	$18 00	@	18 00
Ritchie Mineral of West Virginia	16 60	@	16 00
Trinidad Bitumen	— —	@	14 05

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Jersey City Gas Meter Works, 14 Morris st., Jersey, N. J. 3
Northwestern Gas and Water Pipe Co.—646 Wabash Ave., Chicago, Ill. 7
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Patent Gas Exhauster—Smith & Sayre, 95 Liberty street. 9
The Gas Light Co. of America—Box 5220, New York city. 4

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American Journal of Science and Arts—Silliman and Dana, New Haven Conn. 7
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School of Mines, Columbia College, East 49th st. 5
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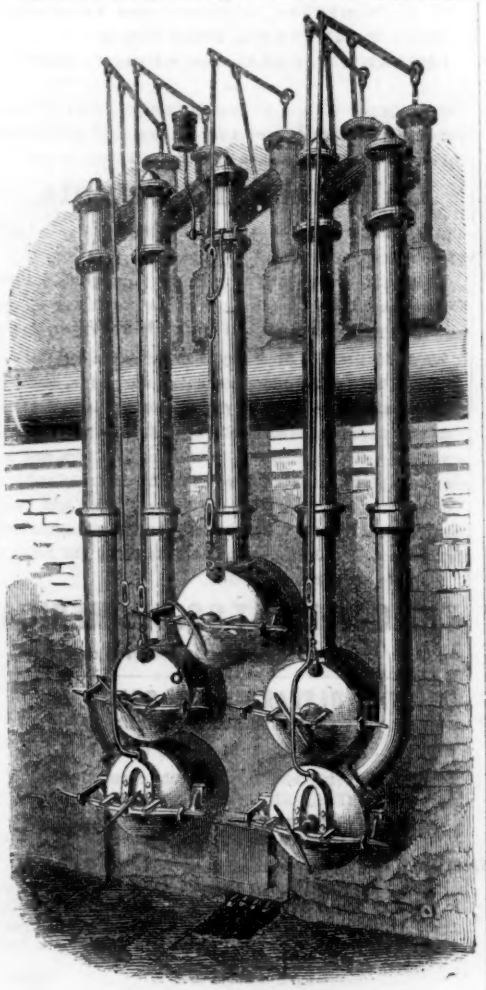

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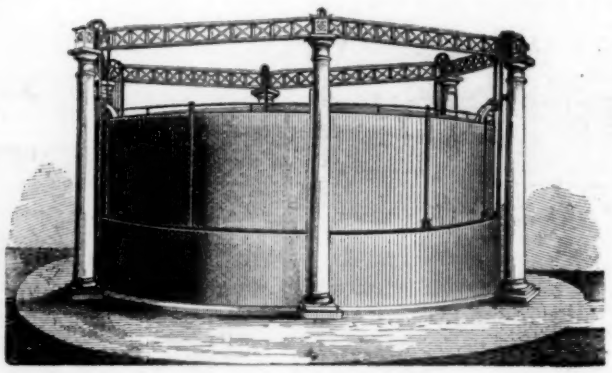

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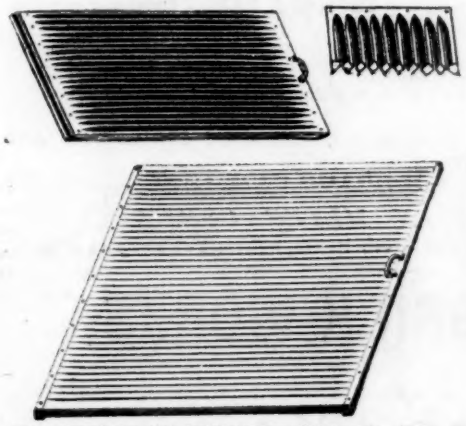

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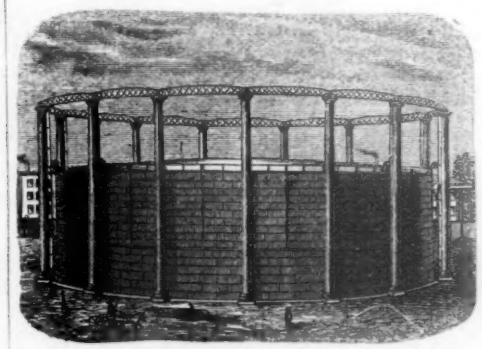

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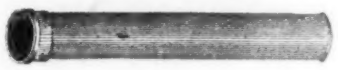

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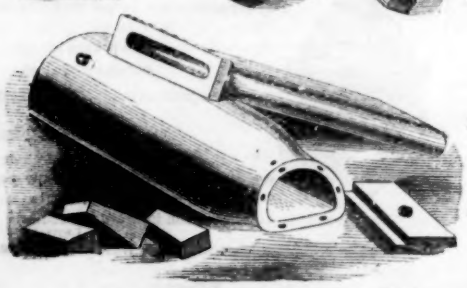

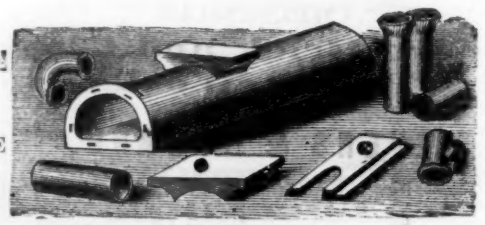

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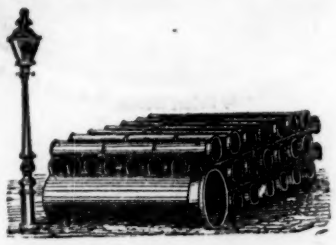

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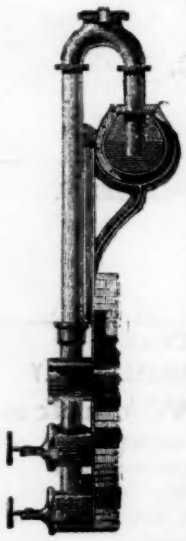

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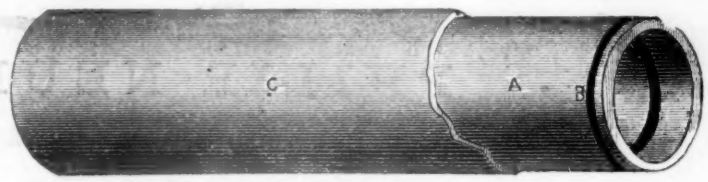

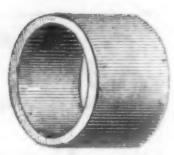

FIG. 2.

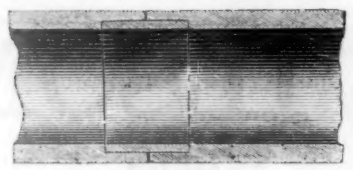

FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3.—Horizontal Section and Connection.

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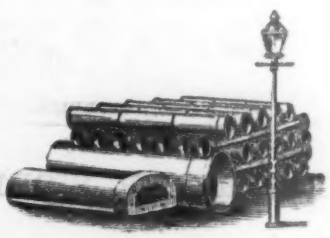

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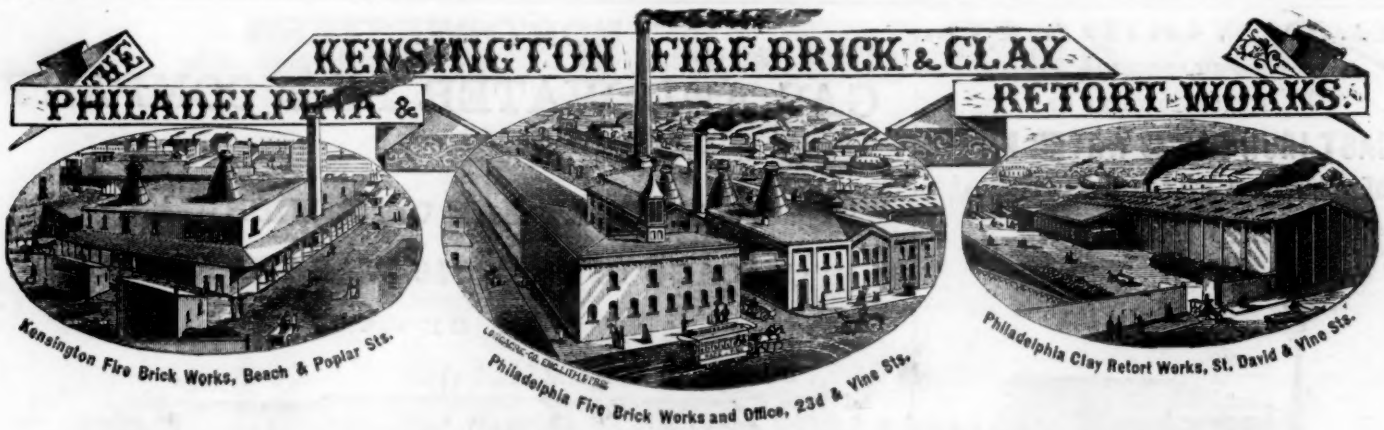
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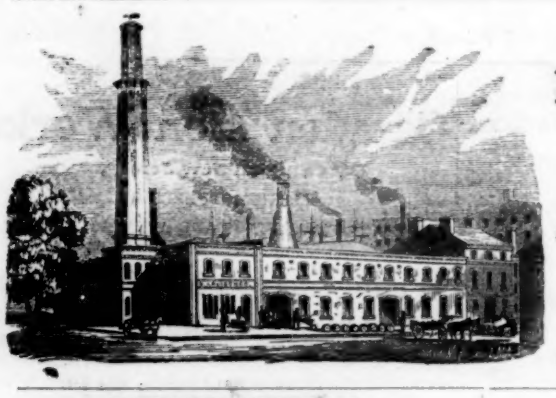

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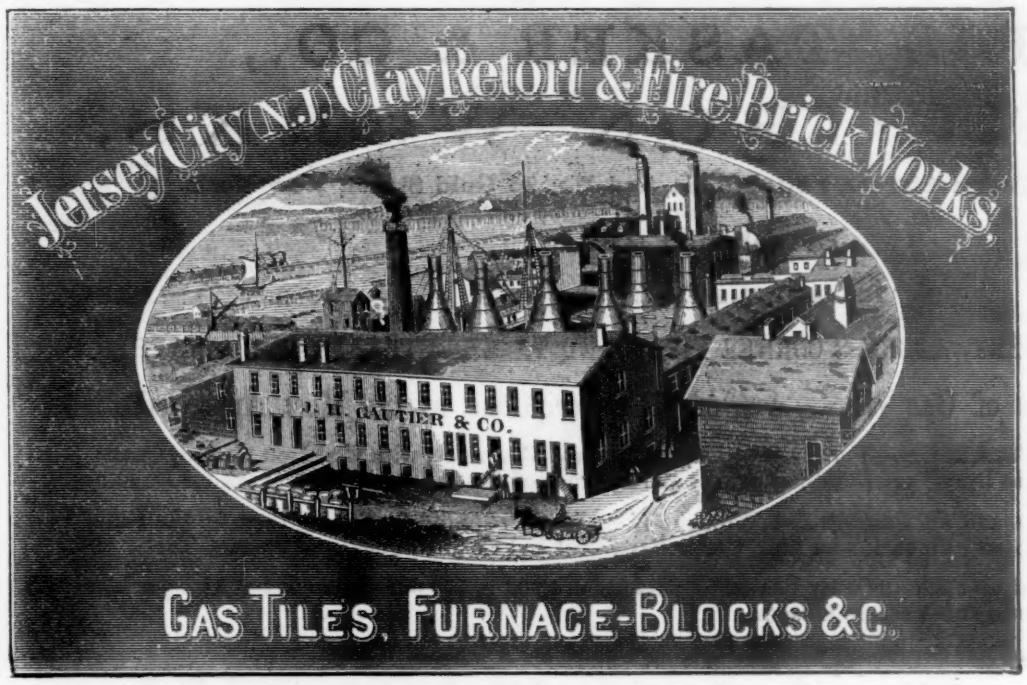

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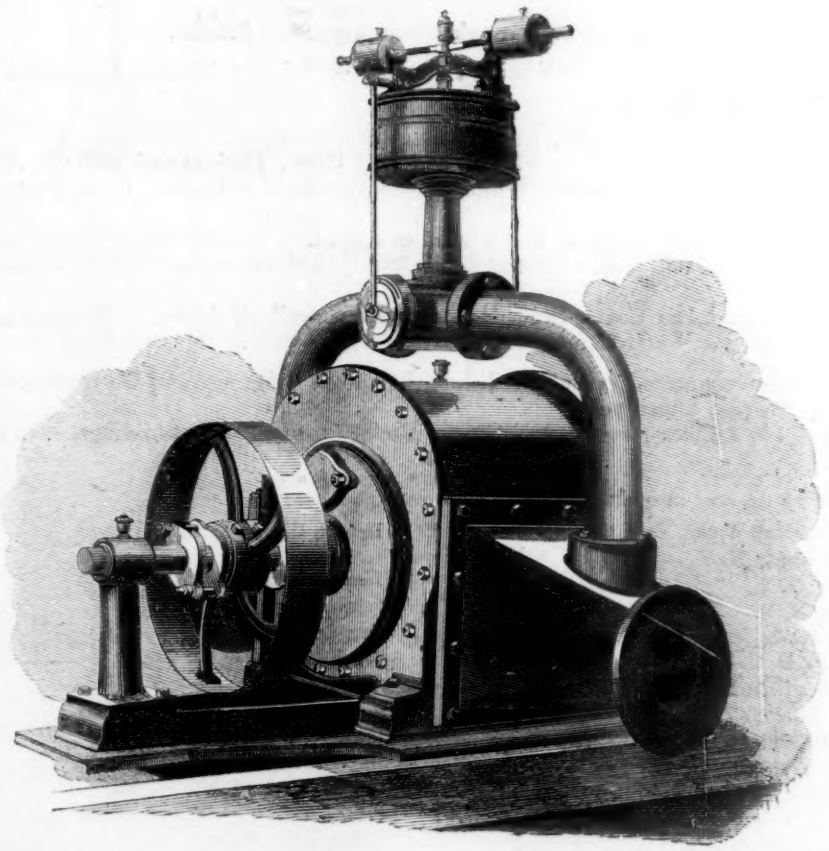

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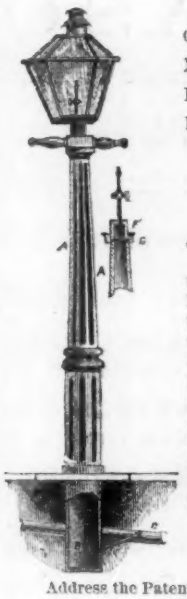

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